**Pace Analytical Services, Inc.**
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

October 03, 2016

Meagan E. Ormand
Golder Associates Inc.
2108 W. Laburnum Ave.
Suite 200
Richmond, VA 23227

RE: Project: Bremo Monthly Process
Pace Project No.: 92314393

Dear Meagan Ormand:
Enclosed are the analytical results for sample(s) received by the laboratory on September 30, 2016. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Nicole Gasiorowski
nicole.gasiorowski@pacelabs.com
Project Manager

Enclosures

cc: Ron DiFrancesco, Golder Associates Inc.
Martha Smith, Golder Associates Inc.
Mike Williams, Golder Associates Inc

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# CERTIFICATIONS

Project: Bremo Monthly Process
Pace Project No.: 92314393

**Ormond Beach Certification IDs**

8 East Tower Circle, Ormond Beach, FL 32174
Alabama Certification #: 41320
Connecticut Certification #: PH-0216
Delaware Certification: FL NELAC Reciprocity
Florida Certification #: E83079
Georgia Certification #: 955
Guam Certification: FL NELAC Reciprocity
Hawaii Certification: FL NELAC Reciprocity
Illinois Certification #: 200068
Indiana Certification: FL NELAC Reciprocity
Kansas Certification #: E-10383
Louisiana Certification #: FL NELAC Reciprocity
Louisiana Environmental Certificate #: 05007
Maryland Certification: #346
Michigan Certification #: 9911
Mississippi Certification: FL NELAC Reciprocity
Missouri Certification #: 236
Montana Certification #: Cert 0074
Nebraska Certification: NE-OS-28-14
Nevada Certification: FL NELAC Reciprocity
New York Certification #: 11608
North Carolina Environmental Certificate #: 667
North Carolina Certification #: 12710
Oklahoma Certification #: D9947
Pennsylvania Certification #: 68-00547
Puerto Rico Certification #: FL01264
South Carolina Certification: #96042001
Tennessee Certification #: TN02974
Texas Certification: FL NELAC Reciprocity
US Virgin Islands Certification: FL NELAC Reciprocity
Virginia Environmental Certification #: 460165
Wyoming Certification: FL NELAC Reciprocity
West Virginia Certification #: 9962C
Wisconsin Certification #: 399079670
Wyoming (EPA Region 8): FL NELAC Reciprocity

**Eden Certification IDs**

205 East Meadow Road Suite A, Eden, NC 27288
North Carolina Drinking Water Certification #: 37738
North Carolina Wastewater Certification #: 633
Virginia/VELAP Certification #: 460025

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## SAMPLE ANALYTE COUNT

Project: Bremo Monthly Process
Pace Project No.: 92314393

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **92314393001** | **T4-160928-1242-S3** | ASTM D4282-02 | KCE | 1 | PASI-E |
| | | EPA 200.7 | CKJ | 8 | PASI-O |

## REPORT OF LABORATORY ANALYSIS

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# PROJECT NARRATIVE

Project: Bremo Monthly Process
Pace Project No.: 92314393

**Method:** **ASTM D4282-02**
**Description:** Cyanide, Free
**Client:** Golder_Dominion_Bremo
**Date:** October 03, 2016

**General Information:**
1 sample was analyzed for ASTM D4282-02. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Additional Comments:**

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# PROJECT NARRATIVE

Project: Bremo Monthly Process
Pace Project No.: 92314393

**Method:** **EPA 200.7**
**Description:** 200.7 MET ICP
**Client:** Golder_Dominion_Bremo
**Date:** October 03, 2016

**General Information:**
1 sample was analyzed for EPA 200.7. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Sample Preparation:**
The samples were prepared in accordance with EPA 200.7 with any exceptions noted below.

**Initial Calibrations (including MS Tune as applicable):**
All criteria were within method requirements with any exceptions noted below.

**Continuing Calibration:**
All criteria were within method requirements with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Additional Comments:**

This data package has been reviewed for quality and completeness and is approved for release.

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## ANALYTICAL RESULTS

Project: Bremo Monthly Process
Pace Project No.: 92314393

**Sample: T4-160928-1242-S3** **Lab ID: 92314393001** Collected: 09/28/16 12:42 Received: 09/30/16 13:50 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **Cyanide, Free** | Analytical Method: ASTM D4282-02 | | | | | | | |
| Cyanide, Free | ND | mg/L | 0.050 | 1 | | 10/03/16 16:00 | 57-12-5 | |
| **200.7 MET ICP** | Analytical Method: EPA 200.7 Preparation Method: EPA 200.7 | | | | | | | |
| Aluminum | ND | ug/L | 100 | 1 | 10/01/16 14:06 | 10/03/16 12:35 | 7429-90-5 | |
| Barium | **374** | ug/L | 10.0 | 1 | 10/01/16 14:06 | 10/03/16 12:35 | 7440-39-3 | |
| Beryllium | ND | ug/L | 1.0 | 1 | 10/01/16 14:06 | 10/03/16 12:35 | 7440-41-7 | |
| Boron | **1460** | ug/L | 50.0 | 1 | 10/01/16 14:06 | 10/03/16 12:35 | 7440-42-8 | |
| Cobalt | ND | ug/L | 10.0 | 1 | 10/01/16 14:06 | 10/03/16 12:35 | 7440-48-4 | |
| Iron | ND | ug/L | 250 | 1 | 10/01/16 14:06 | 10/03/16 12:35 | 7439-89-6 | |
| Molybdenum | **175** | ug/L | 10.0 | 1 | 10/01/16 14:06 | 10/03/16 12:35 | 7439-98-7 | |
| Vanadium | ND | ug/L | 10.0 | 1 | 10/01/16 14:06 | 10/03/16 12:35 | 7440-62-2 | |

## REPORT OF LABORATORY ANALYSIS

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## QUALITY CONTROL DATA

Project: Bremo Monthly Process
Pace Project No.: 92314393

QC Batch: 331565
QC Batch Method: ASTM D4282-02
Associated Lab Samples: 92314393001

Analysis Method: ASTM D4282-02
Analysis Description: ASTM D4282 Free Cyanide

METHOD BLANK: 1837093 Matrix: Water
Associated Lab Samples: 92314393001

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Cyanide, Free | mg/L | ND | 0.050 | 10/03/16 16:00 | |

LABORATORY CONTROL SAMPLE: 1837094

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Cyanide, Free | mg/L | .1 | 0.11 | 107 | 90-110 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1837095 1837096

| Parameter | Units | 92314393001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide, Free | mg/L | ND | .1 | .1 | 0.11 | 0.11 | 106 | 106 | 90-110 | 0 | |

**Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.**

## REPORT OF LABORATORY ANALYSIS

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## QUALITY CONTROL DATA

Project: Bremo Monthly Process
Pace Project No.: 92314393

QC Batch: 323807
QC Batch Method: EPA 200.7
Analysis Method: EPA 200.7
Analysis Description: 200.7 MET
Associated Lab Samples: 92314393001

METHOD BLANK: 1726233 Matrix: Water
Associated Lab Samples: 92314393001

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Aluminum | ug/L | ND | 100 | 10/03/16 12:15 | |
| Barium | ug/L | ND | 10.0 | 10/03/16 12:15 | |
| Beryllium | ug/L | ND | 1.0 | 10/03/16 12:15 | |
| Boron | ug/L | ND | 50.0 | 10/03/16 12:15 | |
| Cobalt | ug/L | ND | 10.0 | 10/03/16 12:15 | |
| Iron | ug/L | ND | 250 | 10/03/16 12:15 | |
| Molybdenum | ug/L | ND | 10.0 | 10/03/16 12:15 | |
| Vanadium | ug/L | ND | 10.0 | 10/03/16 12:15 | |

LABORATORY CONTROL SAMPLE: 1726234

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Aluminum | ug/L | 2500 | 2370 | 95 | 85-115 | |
| Barium | ug/L | 250 | 251 | 100 | 85-115 | |
| Beryllium | ug/L | 25 | 23.8 | 95 | 85-115 | |
| Boron | ug/L | 2500 | 2300 | 92 | 85-115 | |
| Cobalt | ug/L | 250 | 253 | 101 | 85-115 | |
| Iron | ug/L | 2500 | 2480 | 99 | 85-115 | |
| Molybdenum | ug/L | 250 | 244 | 98 | 85-115 | |
| Vanadium | ug/L | 250 | 230 | 92 | 85-115 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1726235 1726236

| Parameter | Units | 35266808001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | ug/L | 94.2J | 2500 | 2500 | 2600 | 2520 | 100 | 97 | 70-130 | 3 | |
| Barium | ug/L | 16.6 | 250 | 250 | 274 | 274 | 103 | 103 | 70-130 | 0 | |
| Beryllium | ug/L | 0.50U | 25 | 25 | 25.3 | 24.6 | 101 | 99 | 70-130 | 3 | |
| Boron | ug/L | 32.5J | 2500 | 2500 | 2480 | 2410 | 98 | 95 | 70-130 | 3 | |
| Cobalt | ug/L | 5.0U | 250 | 250 | 261 | 259 | 104 | 104 | 70-130 | 1 | |
| Iron | ug/L | 0.16 mg/L | 2500 | 2500 | 2700 | 2650 | 101 | 99 | 70-130 | 2 | |
| Molybdenum | ug/L | 5.0U | 250 | 250 | 258 | 254 | 103 | 101 | 70-130 | 1 | |
| Vanadium | ug/L | 5.0U | 250 | 250 | 244 | 234 | 97 | 93 | 70-130 | 4 | |

**Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.**

## REPORT OF LABORATORY ANALYSIS

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# QUALIFIERS

Project: Bremo Monthly Process
Pace Project No.: 92314393

## DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

Acid preservation may not be appropriate for 2 Chloroethylvinyl ether.

A separate vial preserved to a pH of 4-5 is recommended in SW846 Chapter 4 for the analysis of Acrolein and Acrylonitrile by EPA Method 8260.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

## LABORATORIES

| | |
|---|---|
| PASI-E | Pace Analytical Services - Eden |
| PASI-O | Pace Analytical Services - Ormond Beach |

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## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Bremo Monthly Process
Pace Project No.: 92314393

| Lab ID | Sample ID | QC Batch Method | QC Batch | Analytical Method | Analytical Batch |
|---|---|---|---|---|---|
| **92314393001** | **T4-160928-1242-S3** | ASTM D4282-02 | 331565 | | |
| **92314393001** | **T4-160928-1242-S3** | EPA 200.7 | 323807 | EPA 200.7 | 323887 |

| Pace Analytical® | Document Name: Sample Condition Upon Receipt(SCUR) | Document Revised: May 24, 2016 Page 1 of 2 |
|---|---|---|
| | Document No.: F-MEC-CS-009-Rev.03 | Issuing Authority: Pace Mechanicsville Quality Office |



**Sample Condition Upon Receipt**

**Client Name:** Golder

**Project #** WO# : 92314393

92314393

**Courier:** ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☑ Pace ☐ Other:____

**Custody Seal Present?** ☑ Yes ☒ No **Seals Intact?** ☐ Yes ☐ No

**Date/Initials Person Examining Contents:** 9-30-16

**Packing Material:** ☐ Bubble Wrap ☑ Bubble Bags ☐ None ☐ Other:____

**Thermometer:** ☒ RMD001 ☐____ **Type of Ice:** ☑ Wet ☐ Blue ☐ None ☐ Samples on ice, cooling process has begun

**Correction Factor: 0.0°C** **Cooler Temp Corrected (°C):** 2.7 **Biological Tissue Frozen?** ☐ Yes ☐ No ☐ N/A

Temp should be above freezing to 6°C

**USDA Regulated Soil** ( ☐ N/A, water sample)

Did samples originate in a quarantine zone within the United States: CA, NY, or SC (check maps)? ☐ Yes ☐ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

| | | | | Comments/Discrepancy: |
|---|---|---|---|---|
| Chain of Custody Present? | ☑ Yes | ☐ No | ☐ N/A | 1. |
| Samples Arrived within Hold Time? | ☑ Yes | ☐ No | ☐ N/A | 2. |
| Short Hold Time Analysis (<72 hr.)? | ☐ Yes | ☑ No | ☐ N/A | 3. |
| Rush Turn Around Time Requested? | ☑ Yes | ☐ No | ☐ N/A | 4. |
| Sufficient Volume? | ☑ Yes | ☐ No | ☐ N/A | 5. |
| Correct Containers Used? | ☑ Yes | ☐ No | ☐ N/A | 6. |
| -Pace Containers Used? | ☑ Yes | ☐ No | ☐ N/A | |
| Containers Intact? | ☑ Yes | ☐ No | ☐ N/A | 7. |
| Samples Field Filtered? | ☐ Yes | ☐ No | ☑ N/A | 8. Note if sediment is visible in the dissolved container |
| Sample Labels Match COC? | ☑ Yes | ☐ No | ☐ N/A | 9. |
| -Includes Date/Time/ID/Analysis Matrix: WW | | | | |
| All containers needing acid/base preservation have been checked? | ☑ Yes | ☐ No | ☐ N/A | 10. HNO3 pH<2 |
| All containers needing preservation are found to be in compliance with EPA recommendation? ($HNO_3$, $H_2SO_4$, HCl<2; NaOH >9 Sulfide, NaOH>12 Cyanide) | ☑ Yes | ☐ No | ☐ N/A | HCl pH<2 H2SO4 pH<2 NaOH pH>12 |
| **Exceptions:** VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC,LLHg | ☐ Yes | ☐ No | ☑ N/A | NaOH/ZnOAc pH>9 |
| Samples checked for dechlorination? | ☐ Yes | ☐ No | ☑ N/A | 11. |
| Headspace in VOA Vials (>5-6mm)? | ☐ Yes | ☐ No | ☑ N/A | 12. |
| Trip Blank Present? | ☐ Yes | ☐ No | ☑ N/A | 13. |
| Trip Blank Custody Seals Present? | ☐ Yes | ☐ No | ☑ N/A | |
| Pace Trip Blank Lot # (if purchased):____ | | | | |

**CLIENT NOTIFICATION/RESOLUTION** **Field Data Required?** ☐ Yes ☐ No

Person Contacted:____ Date/Time:____

Comments/Sample Discrepancy:____

**Project Manager SCURF Review:** NMG **Date:** 10/3/16

**Project Manager SRF Review:** NMG **Date:** 10/3/16

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. Out of hold, incorrect preservative, out of temp, incorrect containers)

Pace Analytical

# CHAIN-OF-CUS Y / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 1 of 1

| ient Information: | Section B Required Project Information: | Section C Invoice Information: |
|---|---|---|
| Golder Associates | Report To: Mormand@golder.com | Attention: Meagan Ormand |
| 2108 W Laburnum Ave, Ste 200 | Copy To: Martha_Smith@golder.com | Company Name: Golder Associates |
| Richmond,VA 23227 | Ron_Difrancesco@golder.com | Address: gaiapdataentry_invoices@golder.com |
| Mormand@golder.com | Purchase Order No.: | Pace Quote Reference |
| 804-551-0129 Fax: 804-358-2900 | Project Name: Bremo Monthly ~~Compliance~~ Process | Pace Project Manager |
| Due Date/TAT: ~~24 HOUR~~ 3-Day | Project Number: 1520-347.220 | Pace Profile #: |

REGULATORY AGENCY: NPDES | GROUND WATER | DRINKING WATE; UST | RCRA | OTHER

Site Location STATE: VA

Requested Analysis Filtered (Y/N)

Section D Required Client Information

**SAMPLE ID**
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Valid Matrix Codes

| MATRIX | CODE |
|---|---|
| DRINKING WATER | DW |
| WATER | WT |
| WASTE WATER | WW |
| PRODUCT | P |
| SOIL/SOLID | SL |
| OIL | OL |
| WIPE | WP |
| AIR | AR |
| OTHER | OT |
| TISSUE | TS |

| SAMPLE ID | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED COMPOSITE START DATE | COLLECTED COMPOSITE START TIME | COLLECTED COMPOSITE END/GRAB DATE | COLLECTED COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Y/N | Analysis Test: 200.7 - Al, Ba, Be, B, Co | 200.7 - Fe, Mo, V | ASTM4282 - Free Cyanid | Residual Chlorine (Y/N) | 923|4393 Pace Project No./ La |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TH-160928-1242-S3 | WW | G | — | — | 9/28/16 | 1242 | | | | | X | | X | | | | | X | X | X | N | |

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| o be performed under Golder-Pace MSA dated | - Golder | 9/30/16 | 0600 | (Golder) | 9/30/16 | 0600 | | | | |
| | (Golder) | 9/30/16 | 1350 | | 9/30/16 | 1350 | | | | |
| | | 9/30/16 | 328 | Rachel Burruss | 9-30-16 | 1528 | 2.7 | Y | Y | Y |

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: L. Hamelman

SIGNATURE of SAMPLER: DATE Signed (MM/DD/YY): 09/28/16

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact